

# Ecology and Distribution of Lignicolous Fungi in Albania

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## ABSTRACT

The paper includes results of eco-taxonomic studies of lignicolous fungi (Ascomycota and Basidiomycota) in Albania. Generally, these fungi are found in a wide range of broadleaved trees and conifers. The study has been conducted during the period 2011-2014 on different localities in the country but the National Parks have been identified as priority areas for systematic research. A total number of 187 lignicolous fungi have been observed, growing mainly as saprobes or parasites on dead fallen or still attached branch, lying trunks and stumps. High fungal diversity has been established and a number of rare and sensitive species recorded with the current study. The promising results and a lack of earlier data on Albanian fungi have triggered the decision that the pioneer methodical investigation should continue. Some of the recorded species are rare and interesting, and the following should be pinpointed: *Pyrofomes demidoffii*, *Antrodia juniperina*, *Hexagonia nitida*, *Tremiscus helvelloides*, *Amylocortium subsulphureum*, *Asterodon ferruginosus*, etc.

**Key words:** lignicolous fungi, distribution, ecology, Albania

## INTRODUCTION

Macromycetes are species most commonly considered under the term 'fungi', including mushrooms and toadstools, bracket fungi and other fungi of greatest significance in the context of conservation of biodiversity, natural habitats and nature overall. Field research has been done in Llogora NP, Prespa NP, Valbonë Valley NP, Fir of Hotova NP, Shebenik – Jabllanice NP and Korab-Koritnik Natural Park, yielding records of more than 580 species. Systematic research into mycodiversity has not been conducted up till now, and there is only one publication making reference to species (Ivančević & Karadelev, 2013). This paper includes a list – a preliminary inventory of lignicolous fungi species in Prespa NP. The outcome of the activities hitherto within our project 'Fungi Albanici: Establishing Fungi Checklist and Preliminary Red List and Proposing Important Fungal Areas in Albania', sponsored by the Rufford Foundation, was poster-presented at the prestigious Third International Congress on Fungal Conservation, held in Mugla, Turkey, 11-15th November 2013. In due course, our conservation research results will be published in the Fungal Conservation Newsletter of the International Society for Fungal Conservation.



Fig 1. Study areas in Albania.

## MATERIAL AND METHODS

The resources of this paper have been exsiccates deposited in the Macedonian Collection of Fungi (MCF) at the Institute of Biology, Faculty of Natural Science, Ss. Cyril and Methodius University in Skopje, papers published and research notes of the present authors. A data input has been made in specially prepared database software called MACFUNGI.

The determination of the species has been performed during field research and in the Mycological Laboratory within the Institute of Biology, Faculty of Natural Science and Mathematics, Skopje.

For species identification, standard methods have been applied, implying microscoping, application of reagents (Melzer's reagent, Sulphovanilin, Cotton blue, KOH, etc.) and consulting specialised books for identification. The following keys and monographs have been used as resources for determination of the collected fungi: Breitenbach & Kränzlin (1981, 1986, 1991, 1995, 2000), Moser (1983), Boertmann et al. (1992), Hansen & Knudsen (1992), Corfixen et al. (1997), Ahti et al. (2000), Krieglsteiner (2000), Horak (2005), Bernicchia & Gorjón (2010), etc. In a few cases, the names of the species have been modified according to Index Fungorum (<http://www.indexfungorum.org/names/names.asp>) and Mycobank (<http://www.mycobank.org/MycoTaxo.aspx>).

## RESULTS

A total of 187 species-level taxa of fungi has been recorded during the research.

*Abortiporus biennis* (Bull.) Singer  
*Amphinema byssoides* (Pers.) J. Erikss.  
*Amylocortcium subsulphureum* (P. Karst.) Pouzar  
*Amylostereum chailletii* (Pers.) Boidin  
*Antrodia albidoides* A. David & Dequatre  
*Antrodia juniperina* (Murrill) Niemelä & Ryvar den  
*Antrodia ramentacea* (Berk. & Broome) Donk  
*Armillaria cepistipes* Velen.  
*Armillaria mellea* (Vahl) P. Kumn.  
*Armillaria tabescens* (Scop.) Emel  
*Artomyces pyxidatus* (Pers.) Jülich  
*Asterodon ferruginosus* Pat.  
*Auricularia auricula-judae* (Bull.) J. Schröt.  
*Auricularia mesenterica* (Dicks.) Pers.  
*Auriscalpium vulgare* Gray  
*Bisporella citrina* (Batsch) Korf & S.E. Carp.  
*Botryobasidium botryosum* (Bres.) J. Erikss.  
*Botryobasidium laeve* (J. Erikss.) Parmasto  
*Botryobasidium subcoronatum* (Höhn. & Litsch.) Donk  
*Byssomerulius corium* (Pers.) Parmasto  
*Calocera cornea* (Batsch) Fr.  
*Ceriporia reticulata* (Hoffm.) Domanski  
*Cerrera unicolor* (Bull.) Murrill  
*Clavulinopsis corniculata* (Schaeff.) Corner  
*Collybia tuberosa* (Bull.) P. Kumm.  
*Coprinus micaceus* (Bull.) Fr.  
*Corticium polygonioides* P. Karst.  
*Corticium juniperophilum* Litsch.  
*Corticium meridioroseum* Boidin & Lanq.  
*Corticium roseum* Pers.  
*Crepidotus cesatii* (Rabenh.) Sacc.  
*Crepidotus lundellii* Pilát  
*Crepidotus mollis* (Schaeff.) Staude  
*Crepidotus versutus* (Peck) Peck  
*Crucibulum laeve* (Huds.) Kambly  
*Cyathicula cyathoidea* (Bull.) Thüm.  
*Cyathus striatus* (Huds.) Willd.  
*Cylindrobasidium evolvens* (Fr.) Jülich  
*Dacrymyces variisporus* McNabb  
*Daedaleopsis confragosa* (Bolton) J. Schröt.  
*Diatrype disciformis* (Hoffm.) Fr.  
*Diatrype stigma* (Hoffm.) Fr.  
*Dichomitus campestris* (Quél.) Domanski & Orlicz  
*Exidia pithya* (Alb. & Schwein.) Fr.  
*Exidia truncata* Fr.  
*Exidiopsis calcea* (Pers.) K. Wells  
*Exidiopsis effusa* Bref.  
*Fistulina hepatica* (Schaeff.) With.  
*Fomes fomentarius* (L.) Fr.  
*Fomitopsis pinicola* (Sw.) P. Karst.  
*Funalia gallica* (Fr.) Bondartsev & Singer  
*Galerina autumnalis* (Peck) A.H. Sm. & Singer  
*Galerina marginata* (Batsch) Kühner  
*Galerina stylifera* (G.F. Atk.) A.H. Sm. & Singer  
*Gloeocystidiellum luridum* (Bres.) Boidin  
*Gloeocystidiellum porosum* (Berk. & M.A. Curtis) Donk  
*Gloeopeniophorella convolvens* (P. Karst.) Boidin  
*Gloeophyllum abietinum* (Bull.) P. Karst.  
*Gloeophyllum sepiarium* (Wulfen) P. Karst.  
*Gloiothele citrina* (Pers.) Ginns & G.W. Freeman  
*Gymnopilus bellulus* (Peck) Murrill  
*Gymnopilus penetrans* (Fr.) Murrill  
*Gymnopilus sapineus* (Fr.) Maire  
*Gymnopilus sordidostipes* Hesler  
*Gymnosporangium clavariiforme* (Wulfen) DC  
*Hemimycena pithya* (Fr.) Dörfelt  
*Hericium coralloides* (Scop.) Pers.  
*Hericium erinaceus* (Bull.) Pers.  
*Hexagonia nitida* Durieu & Mont.  
*Humaria hemisphaerica* (Hoffm.) Fuckel  
*Hymenochaete rubiginosa* (Dicks.) Lév.  
*Hymenoscyphus conscriptus* (P. Karst.) Korf  
*Hymenoscyphus imberbis* (Bull.) Dennis  
*Hyphoderma argillaceum* (Bres.) Donk  
*Hyphoderma praetermissum* (P. Karst.) J. Erikss. & Å. Strid  
*Hyphoderma setigerum* (Fr.) Donk  
*Hyphodermella corrugata* (Fr.) J. Erikss. & Ryvar den  
*Hyphodontia alutaria* (Burt) J. Erikss.  
*Hyphodontia aspera* (Fr.) J. Erikss.  
*Hyphodontia crustosa* (Pers.) J. Erikss.  
*Hyphodontia juniperi* (Bourdot & Galzin) J. Erikss. & Hjortstam  
*Hyphodontia sambuci* (Pers.) J. Erikss.  
*Hypholoma capnoides* (Fr.) P. Kumm.  
*Hypholoma lateritium* (Schaeff.) P. Kumm  
*Hypholoma sublateritium* (Fr.) Quél.  
*Hypocrea citrina* (Pers.) Fr.  
*Hypocrea rufa* (Pers.) Fr.  
*Hypoxylon fragiforme* (Pers.) J. Kickx f.  
*Kuehneromyces mutabilis* (Schaeff.) Singer & A.H. Sm.  
*Laetiporus sulphureus* (Bull.) Murrill  
*Lentinellus omphalodes* (Fr.) P. Karst.  
*Lenzites betulina* (L.) Fr.  
*Lycogala epidendrum* (L.) Fr.  
*Lycoperdon pyriforme* Willd.  
*Marasmius bulliardii* Quél.  
*Marasmius rotula* (Scop.) Fr.  
*Megacollybia platyphylla* (Pers.) Kotl. & Pouzar  
*Merulius tremellosus* Schrad.  
*Microsphaera alphitoides* Griffon & Maubl.  
*Multiclavula mucida* (Pers.) R.H. Petersen  
*Mycena crocata* (Schrad.) P. Kumm.  
*Mycena epipterygia* (Scop.) Gray  
*Mycena galericulata* (Scop.) Gray  
*Mycena inclinata* (Fr.) Quél  
*Mycena polygramma* (Bull.) Gray  
*Mycena renati* Quél.  
*Mycena sanguinolenta* (Alb. & Schwein.) P. Kumm.  
*Mycena stipata* Maas Geest. & Schwöbel  
*Mycocacia fuscoatra* (Fr.) Donk  
*Omphalotus olearius* (DC.) Singer  
*Onnia tomentosa* (Fr.) P. Karst.  
*Osmoporus odoratus* (Wulfen) Singer  
*Panellus stipticus* (Bull.) P. Karst.  
*Peniophora incarnata* (Pers.) P. Karst.  
*Peniophora lycii* (Pers.) Höhn. & Litsch.  
*Peniophora meridionalis* Boidin  
*Peniophora piceae* (Pers.) J. Erikss.  
*Peniophora pini* (Schleich.) Boidin

*Peniophora proxima* Bres.  
*Peniophora quercina* (Pers.) Cooke  
*Phanerochaete sordida* (P. Karst.) J. Erikss. & Ryvar den  
*Phanerochaete tuberculata* (P. Karst.) Parmasto  
*Phanerochaete velutina* (DC.) P. Karst.  
*Phellinus conchatus* (Pers.) Qué l.  
*Phellinus hartigii* (Allesch. & Schnabl) Pat.  
*Phellinus punctatus* (P. Karst.) Pilát  
*Phellinus ribis* (Schumach.) Qué l.  
*Phellinus robustus* (P. Karst.) Bourdot & Galzin  
*Phlebia queletii* (Bourdot & Galzin) M.P. Christ.  
*Phlebia tremellosa* (Schrad.) Nakasone & Burds.  
*Phlebiopsis gigantea* (Fr.) Jülich  
*Phlebiopsis ravenelii* (Cooke) Hjortstam  
*Pholiota cerifera* (P. Karst.) P. Karst.  
*Pholiota squarrosa* (Oeder) P. Kumm.  
*Pleurotus pulmonarius* (Fr.) Qué l.  
*Pluteus nanus* f. *nanus* (Pers.) P. Kumm.  
*Pluteus thomsonii* (Berk. & Broome) Dennis  
*Polyporus arcularius* (Batsch) Fr.  
*Polyporus brumalis* (Pers.) Fr.  
*Polyporus ciliatus* Fr.  
*Polyporus varius* (Pers.) Fr.  
*Porothelium fimbriatum* (Pers.) Fr.  
*Postia subcaesia* (A. David) Jülich  
*Postia tephroleuca* (Fr.) Jülich  
*Propolis versicolor* (Fr.) W. Phillips  
*Pseudohydnum gelatinosum* (Scop.) P. Karst.  
*Pycnoporus cinnabarinus* (Jacq.) P. Karst.  
*Pyrofomes demidoffii* (Lév.) Kotl. & Pouzar  
*Radulomyces molaris* (Chaillet ex Fr.) M.P. Christ.  
*Resupinatus applicatus* (Batsch) Gray  
*Rhytisma acerinum* (Pers.) Fr.  
*Rugosomyces ionides* (Bull.) Bon  
*Sarcoscypha coccinea* (Scop.) Sacc.

*Schizophyllum commune* Fr.  
*Schizopora paradoxa* (Schrad.) Donk  
*Schizopora radula* (Pers.) Hallenb.  
*Scopuloides hydroides* (Cooke & Masee) Hjortstam & Ryvar den  
*Scopuloides rimosa* (Cooke) Jülich  
*Scutellinia scutellata* (L.) Lambotte  
*Scytinostroma aluta* Lanq.  
*Scytinostroma hemidichophyticum* Pouzar  
*Sebacina grisea* Bres.  
*Skeletocutis amorpha* (Fr.) Kotl. & Pouzar  
*Steccherinum ochraceum* (Pers. ex J.F. Gmel.) Gray  
*Stereum hirsutum* (Willd.) Pers.  
*Stereum insignitum* Qué l.  
*Stereum rugosum* Pers  
*Stereum sanguinolentum* (Alb. & Schwein.) Fr.  
*Strobilurus tenacellus* (Pers.) Singer  
*Subulicystidium longisporum* (Pat.) Parmasto  
*Tomentella atramentaria* Rostr.  
*Tomentella bryophila* (Pers.) M.J. Larsen  
*Tomentella terrestris* (Berk. & Broome) M.J. Larsen  
*Trametes hirsuta* (Wulfen) Pilát  
*Trametes versicolor* (L.) Lloyd  
*Trechispora farinacea* (Pers.) Liberta  
*Trechispora microspora* (P. Karst.) Liberta  
*Tremiscus helvelloides* (DC.) Donk  
*Trichaptum abietinum* (Pers. ex J.F. Gmel.) Ryvar den  
*Trichaptum hollii* (J.C. Schmidt) Kreisel  
*Tubulicrinis glebulosus* (Fr.) Donk  
*Volvariella bombycina* (Schaeff.) Singer  
*Vuilleminia comedens* (Nees) Maire  
*Vuilleminia coryli* Boidin  
*Vuilleminia megalospora* Bres.  
*Xerula radicata* (Relhan) Dörfelt  
*Xylaria hypoxylon* (L.) Grev.

## CONCLUSION

Field study has been conducted at over 30 localities, and, for the purpose of achieving greater diversity of species, research has been conducted on different substrates and associations.

The field studies have included sites with representative vegetation, consisting of meadows and pastures, deciduous and coniferous forests and specific forest stands with junipers, molika pine, Mediterranean maquis, etc.

The total number of species recorded is 187, primarily from Basidiomycota (171). There are 15 species belonging to Ascomycota and one species to Myxomycota. Some of the observed species are rare and interesting, and the following can be highlighted: *Pyrofomes demidoffii*, *Antrodia juniperina*, *Hexagonia nitida*, *Tremiscus helvelloides*, *Amylocorticium subsulphureum*, *Asterodon ferruginosus*, etc.

Pertaining to lignicolous species, most of them have been collected in different pine associations (*Pinus nigra*, *P. silvestris*, *P. heldreichii*), oak forests (*Quercus frainetto*, *Q. cerris*, *Q. trojana*, *Q. coccifera*, *Q. macrolepis*, *Q. ilex*, *Q. pubescens*), beech, spruce and fir forests, then azonal vegetation (*Salix alba*, *Populus tremula*, *Platanus orientalis*, etc.), juniper forest (*Juniperus excelsa* and *J. foetidissima*), *Pinus halepensis* plantings, etc.

Part of the registered species, such as *Antrodia juniperina* and *Pyrofomes demidoffii*, are characteristic parasites or saprobes on juniper trees, predominantly on *Juniperus excelsa*, while *Hexagonia nitida* is typical of the Macedonian oak (*Quercus trojana*).

The species *Amphinema byssoides*, *Amylocorticium subsulphureum*, *Amylostereum chailletii*, *Auriscalpium vulgare*, *Collybia tuberosa*, *Hyphodontia aspera*, *Mycena epipterygia*, *Phanerochaete sordida*, *Porothelium*

*fimbriatum*, *Stereum sanguinolentum*, *Strobilurus tenacellus*, *Trichaptum hollii* and *Tubulicrinis glebulosus* have been found only once on black pine, while species such as *Gloeophyllum abietinum*, *Phlebiopsis gigantea*, *Schizopora radula*, *Sebacina grisea* are known only from Aleppo pine (*Pinus halepensis*). The species *Gymnopilus sordidostipes*, *Peniophora pini* and *Tomentella atramentaria*, are well-known saprotrophs on *Pinus leucodermis*.

The species *Auricularia auricula-judae*, *Exidia truncata*, *Exidiopsis effusa*, *Peniophora quercina*, *Radulomyces molaris* and *Vuilleminia megalospora* are saprobes more or less characteristic of oak trees. The rest of the species are not so substrate-specific.

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